National Aeronautics and Space Administration

SBIR/STTR Economic Impact Report

FY 2012

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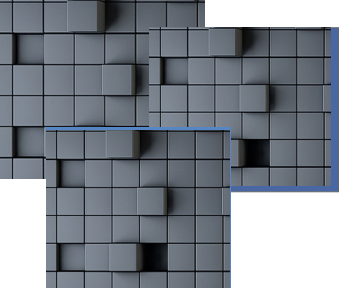
Economic Impact Report

NASA Small Business Innovation Research
Small Business Technology Transfer

FY 2012



I. Executive Summary

The National Aeronautics and Space Administration's (NASA) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are highly competitive three-phase award programs, which provide qualified small business concerns (SBCs) with opportunities to propose and develop innovative ideas that meet the specific research and development needs of the Federal Government. Specific technological research areas funded typically address the future mission needs of NASA's Mission Directorates – Science, Aeronautics Research, Human Exploration and Operations, and Space Technology.

This study estimates the national economic and fiscal impact of NASA SBIR/STTR investments into the program's SBCs using the standard practice of input-output modeling. The time frame covered for this analysis was the fiscal year ending in September 2012. For purposes of this study, NASA's SBIR and STTR programs' economic impact derives from the annual research and development operations, which was undertaken by the programs' small business concerns during the fiscal year. In total, NASA SBIR and STTR small businesses received a total of $158,480,892.23 ($139,950,422.96 allocated to SBIR participating small businesses and $18,530,469.27 allocated to STTR participating small businesses) for the development of R&D technologies.

Table 1 - NASA SBIR and STTR Obligated Funding for FY12

Program	Obligated Funding
SBIR	$139.95 Million
STTR	$18.53 Million
Total	$158.48 Million

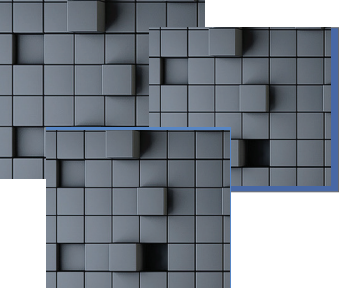
Economic and Fiscal Impact

The investments and subsequent economic and fiscal impact of the STTR and SBIR programs propagate through-out the United States. While small businesses from 38 states received awards, the economic effects occurred nation-wide, as supplier and income effects also occur in states in which no small businesses received awards. The economic and fiscal impact stemming from the program's investments are listed in the table below.

Table 2 - Total Economic Impact of NASA SBIR and STTR Obligated Funding

	SBIR	STTR	Total
Total Investment ($Millions)	$139.95	$18.53	$158.48
Total Economic Impact			
Employment (jobs)	3,341	442	3,784
Labor Income ($Millions)	$227.17	$30.07	$257.25
Output ($Millions)	$557.68	$73.84	$631.53
Total Fiscal Impact			
Total Taxes ($Millions)	$63.78	$8.44	$72.23
Federal ($Millions)	$42.63	$5.64	$48.27
State and Local ($Millions)	$21.15	$2.80	$23.95

NASA's SBIR and STTR program plays an important role not only within the Nation's research and development sector but the economy as a whole. In total, $158.4 million in NASA SBIR and STTR funds supported approximately 3,340 American jobs, $257.2 million in additional wages, and $631.5 million in Gross Domestic Product (GDP). $48.2 million in federal tax income was created and NASA's awards also generated an estimated $23.9 million in taxes for State and Local jurisdictions.



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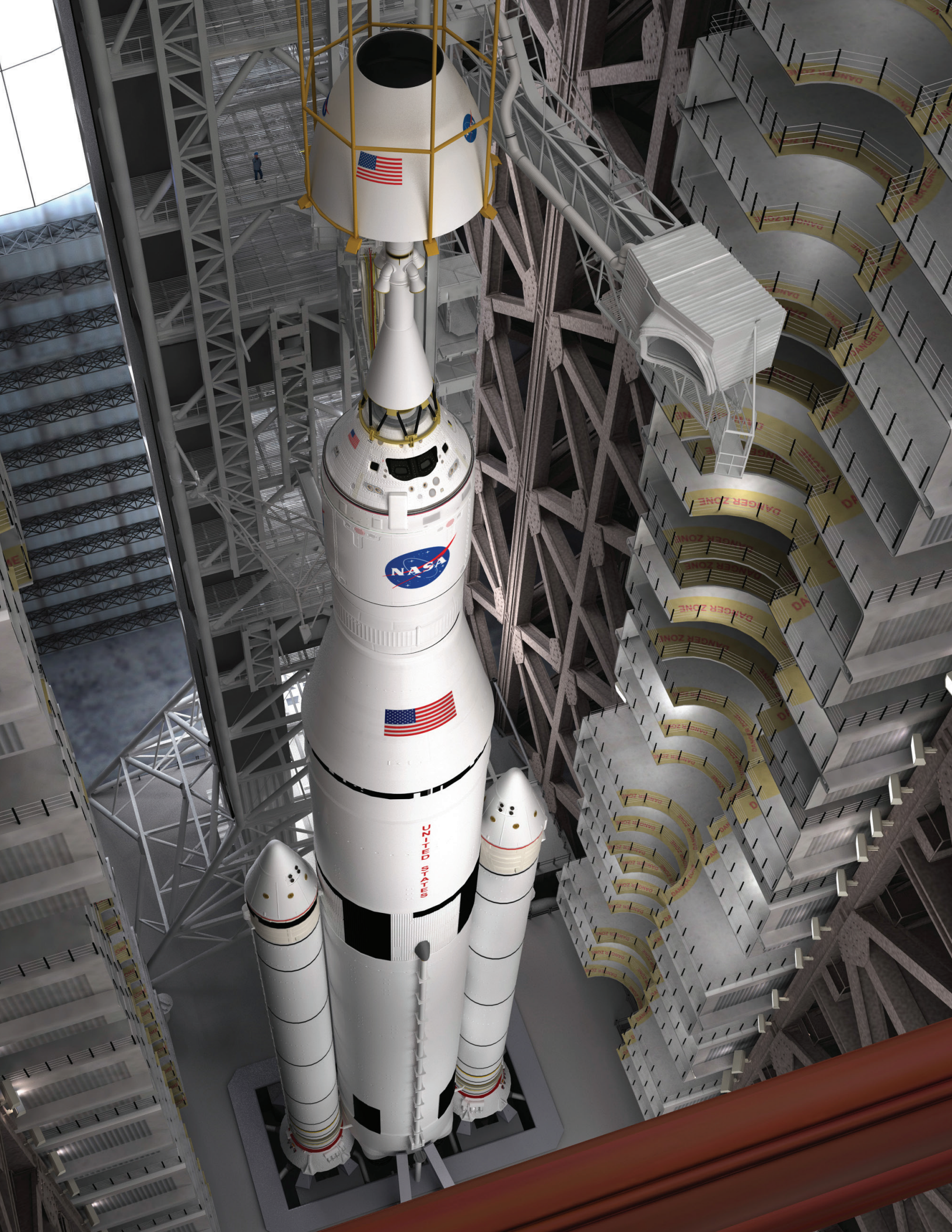
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II. Introduction

Scope of Work

As established by Section 9 of the Small Business Act (15 U.S.C. 638), as amended by the SBIR/STTR Reauthorization Act of 2011, the SBIR/STTR programs of all eligible agencies shall develop metrics to evaluate the effectiveness, and the benefit to the people of the United States, of the SBIR program and the STTR program of the Federal agency that

a) are science-based and statistically driven;
b) reflect the mission of the Federal agency; and
c) include factors relating to the economic impact of the programs.

Recognizing the importance placed upon the effective evaluation of the programs' benefit to the American people, this analysis is the first step in creating a science-based and statistically driven estimate of the economic impact of NASA's SBIR and STTR program. Specifically, this analysis calculates the impacts of the program's operations within the United States for the fiscal year 2012.

The introduction describes the study's methodology, detailing the general concept of input-output modeling, the IMPLAN model in particular, and establishing the science-based and statistically driven framework of the analysis. The introduction also contains a short narrative that describes the use of input-output modeling at the federal, state, and local level. Following, the study details awards of NASA SBIR and STTR programs and the economic activities undertaken by the program's awardees. The study calculates the increase in participating firm revenues as a result of receiving NASA SBIR and STTR awards and utilizing this data, the programs' total economic and fiscal impacts are estimated. The total economic impacts, including employment, labor income, and output, are disaggregated by industry sector. To provide a visual interpretation of NASA's SBIR and STTR investments, the study maps the location of program awardees and the amount of federal investment by state.

The appendix contains a table detailing the economic impacts across all industry sectors.

Methodology and the IMPLAN Model

The theoretical underpinnings of input-output modeling are based upon the notion of inter-industry transactions: industries use the products of other industries to produce their own products. This approach allows one to estimate the number goods and services from other sectors (input) that are required to produce goods and services in the sector of analysis (output). The combined affect across all sectors can be summed to calculate a total economic impact. Input-output modeling is widely used by the various levels of Government to estimate the regional economic impacts of changes in government expenditures, private enterprise, and individual consumption choices. Input-output modeling enables decision-making processes within Government to more fully understand the economic effects (in terms of jobs, output, earnings and taxes) and optimize policy response accordingly.

This analysis utilizes NASA SBIR and STTR obligated funding data, as reported to the Small Business Administration (SBA), in NASA's FY2012 annual report as the basis of the analysis. $158,480,892.23 in agency obligated funds were transformed into employment financial equivalents (jobs) using U.S. Economic Census data for NAICS 541712 [Research and development in the physical, engineering, and life sciences (except biotechnology)]. This transformation ensures more precise modeling because NAICS 541712 more accurately represents NASA SBIR and STTR participating firms' economic activity and basic characteristics.[1]

Converted employment financial equivalent figures were used as an input and modeled using MIG, Inc.'s IMPLAN software.[2] The IMPLAN model is a robust, industry-standard input-output model that provides insight into economic impacts at different levels of the economy: from the national level down to the ZIP code level. The IMPLAN model is based on the input-output data from the

1 Firms in NAICS 541712 are limited in size to 500 employees and are engaged primarily in research and development activities relating too physical, engineering, and life sciences (except Biotechnology). Firms within more broad NAICS categories have differing size limits and may be primarily engaged in research areas not applicable to NASA's SBIR and STTR programs, (such as social science, humanities, and biotechnology).

2 IMPLAN was originally developed in 1979 by a joint effort between U.S. Forest Service, the Federal Emergency Management Agency, and the U.S. Department of the Interior's Bureau of Land Management with the goal of assisting in land and resource management planning. The model is used by additional government agencies to quantify various economic activities. For more details see: Miller, Ronald E., and Peter D. Blair. Input-output Analysis: Foundations and Extensions. Englewood Cliffs, NJ: Prentice-Hall, 1985.

U.S. National Income and Product Accounts from the Bureau of Economic Analysis. The model contains 528 industry sectors that are based on the North American Industry Classification Systems (NAICS). Its framework is considered static because the impacts calculated for any scenario by the model are estimates of the indirect and induced impacts for a one-year time period. For application to the NASA SBIR/STTR Program, the IMPLAN model was calibrated at a national level and all economic activity was modeled under IMPLAN sector 376. No additional changes were made to the IMPLAN model. All dollar values are displayed in 2012 dollars, consistent with the year of program operations studied in this analysis.

The IMPLAN model contains two components: the descriptive model and the predictive model. The descriptive model maps the economy within the region of analysis using a series of accounting tables that trace flows of funds (dollars) between purchasers and producers in the defined region. The model also captures region's movement of exported and imported goods and services. The descriptive models also includes IMPLAN's Social Accounting MAtrices (SAM), which define the flow of funds between institutions — such as transfer payments form governments to businesses and households and taxes paid by households and businesses to governments.

The predictive model contains a set of multipliers that can be used to analyze the changes in final demand and their subsequent ripple effects throughout the region of analysis. These ripple effects are often larger than the initial effect oas recipients of the initial payments spend a portion of the funds, and the recipients of the new funds spend a portion of the funds as well, and so on and so forth. These effects are reported in terms of value added to the economy (GDP), jobs, and tax revenue. All employment figures estimated through the IMPLAN model include all full-time, part time, and temporary positions. [3] Similar input-output models include the Bureau of Economic Analysis's (BEA) RIMS II model as well as various proprietary models such as REMI, EMSI and REDYN. While each model has its own unique aspects, the theoretical underpinnings are shared and thus the modeling results are comparable.

3 IMPLAN Pro User Guide

Government Uses of I-O modeling

Specific to the federal level, agencies utilize input-output analysis in assessing the economic potential of scientific and social programs, military and other installations, budget adjustments, as well as infrastructure and other development projects. Some examples of federal uses of input-out modeling include:

- The Department of Defense (DoD) uses various input-out models to assess the economic impacts of large scale budgetary decisions, such as the effects of the 2012 sequestration.[4] The DoD also calculates the effect of smaller regional budgetary decisions, such as the closure of Hill Air Force Base in the State of Utah.[5]
- The Department of Transportation utilizes input-output analysis to further inform their decision making process when deciding which projects to undertake, in compliment to Benefits Cost Analysis.[6] The agency also encourages state and local agencies to utilize similar methodologies when pursing local projects as well.
- The Department of Interior calculates the entire agency's annual economic impact. In 2009, their analysis concluded that the agency supports over 1.4million jobs for Americans and over $370 billion in economic activity.[7]
- In 2010, the U.S. Department of Agriculture calculated that, given an increase of $1 billion dollars in expenditures, the Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp Program) is estimated to increase economic activity (GDP) by $1.79 billion and generate approximately 13,500 jobs. This analysis further codified previous estimates from 2002, which suggested a $1 billion increase in spending generated $1.84 billion in economic activity.

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4 Levine, Linda. N.p., 1 Oct. 2012. Web. 26 Jan. 2013.<http://journalistsresource.org/wp-content/uploads/2012/10/R42763.pdf>

5 Utah Defense Alliance. Jan E. Crispin-Little, Pamela S. Perlich. N.p.. Web. 26 Jun 2013. <http://www.bebr.utah.edu/Documents/studies/HAFB04.pdf>.

6 United States. Department of Transportation. Office of Asset Management (HIAM).Economic Analysis Primer. N.p., n.d. Web. 26 Jun 2013. <http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer.pdf>

7 United States. Department of Interior. Salazar, K.. N.p.. Web. 26 Jun 2013. <http://www.doi.gov/news/pressreleases/upload/DOI_Economic-Impacts-Report.pdf>.

The Environment Protection Agency encourages States to assess their own clean energy initiatives using input-output modeling.[8] State and Local governments use of input-output models is as varied as the Federal Government's use of the methodology, and includes:

- State tourism boards —such as the Hawaii Tourism Authority— use various visitor spending surveys combined with input-output analysis to calculate the effect of tourism within state or regional economies[9]. Because tourist expenditures are made by out-of-region consumers, theoretical questions regarding displaced demand and "crowding out" effects can be ignored— thus making economic impact analysis transparent to these factors.
- Regional development agencies and municipalities use input-output studies to estimate employment and tax benefits associated with the opening of national chain retail operations— such as a Walmart in Bennington, Vermont[10].
- Cities also utilize input-out studies to determine the costs and benefits of public-private projects, such as sporting stadiums and arenas. In a recent example, input-output modeling was used to calculate a negative economic impact of building a proposed baseball stadium in Portland, Oregon[11].

Limitations

The economic and fiscal impacts calculated in this study are attributable to NASA's SBIR and STTR award funding for FY2012, i.e. the directly measurable economic impacts associated with approximately $158.48 million worth of aerospace research and development contracts awarded by NASA. This study does not attempt to estimate the additional positive indirect economic and

8 "Quantifying Economic Benefits | State and Local | US EPA." EPA. Environmental Protection Agency, n.d. Web. 26 June 2013.<http://www.epa.gov/statelocalclimate/state/activities/quantifying-econ.html>

9 "2011 Annual Visitor Research Report." 2011 Annual Visitor Research Report — Hawaii Tourism Authority. Hawaii Tourism Authority, 1 Jan. 2012. Web. 07 July 2013. <http://www.hawaiitourismauthority.org/default/assets/File/reports/visitor-statistics/2011%20Annual%20Visitor%20Research%20Report(2).pdf>.

10 "Regional Economic Impact Analysis Associated with Proposed Wal-Mart Expansion in Bennington, Vermont." Institute for Local Self-Reliance. N.p., Dec. 2007. Web. 17 July 2013. <www.ilsr.org/wp-content/uploads/files/benningtoneis_0.pdf>

11 Pozdena, Randall, Abe Farkas, and Nick Popenuk. "ECONOMIC IMPACT OF PROPOSED BASEBALL STADIUM." Portland Mercury. N.p., 12 May 209. Web. 17 July 2013. <http://www.portlandmercury.com/images/blogimages/2009/05/26/1243382083-lents_stadium_jobs.pdf>.

fiscal impacts of technical innovations developed by the program, nor does this study attempt to estimate the additional economic and fiscal impacts that can be attributed to SBIR and STTR award participants because of their participation with the program. These additional economic and fiscal impacts which occur at the firm level, such as future sales of newly developed innovations, the increase in future government contracts, increased outside investment, new product lines, and other business expansion are difficult to fully capture[12] but are thought to be significant. NASA's SBIR and STTR programs anticipate conducting future research in the form of case studies and longitudinal firm performance studies in order to more fully capture and quantify these indirectly measurable economic effects.

Program Overview

NASA considers technological innovation to be vital to the performance of the NASA mission and to the Nation's prosperity and security. The agency views the NASA SBIR and STTR programs as an integral tool to realizing both the agency's and nation's technological innovation goals. The purpose of the SBIR and STTR programs, as established by law[13], is to stimulate technological innovation in the private sector; to strengthen the role of SBCs in meeting Federal research and development needs; to increase the commercial application of the research results of the programs; and to encourage participation of socially and economically disadvantaged persons and women-owned small businesses.

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12 Godin, Benoit, and Christian Dore. "Measuring the Impacts of Science: Beyond the Economic Dimension." (n.d.): n. pag. Canadian Social Sciences and Humanities Research Council (SSHRC), 2000. Web. <http://www.csiic.ca/PDF/Godin_Dore_Impacts.pdf>.

13 NASA's SBIR and STTR programs are SBIR and STTR opportunities are operated pursuant to the Small Business Innovation Development Act of 1982, P.L. 97-219 (codified at 15 U.S.C. 638) as amended by the Small Business Innovation Research (SBIR) Program, Extension, P.L. 99-443 which extended the program through September 30, 1993. On October 28, 1992, through the Small Business Innovation Research and Development Act of 1992 (P.L. 102-564), Congress reauthorized and extended the SBIR Program for another seven years (2000). Subsequently, on December 21, 2000, through the Small Business Reauthorization Act of 2000 (P.L. 106-554) Congress again reauthorized the SBIR Program. With the approval of H.R. 2608, Continuing Appropriations Act 2012, the SBIR Program was authorized through December 31, 2011. On December 31, 2011, the President signed into law the National Defense Reauthorization Act of 2012 (Defense Reauthorization Act), P. L. 112-81, Section 5001, Division E of the Defense Reauthorization Act contains the SBIR/STTR Reauthorization Act of 2011 (SBIR/STTR Reauthorization Act), which extends both the SBIR and Small Business Technology Transfer (STTR) programs through September 30, 2017.

NASA's SBIR program is the third largest of the 11 participating federal agencies. NASA awards SBIR contracts in three phases. A Phase I award is largely a feasibility analysis which is used to determine the commercial merit and technical feasibility of an innovation; a follow-on Phase II award is for continued development, demonstration and delivery of the innovation; a subsequent Phase III award is for the commercialization and transition of the innovation into a NASA mission or marketplace.

NASA's STTR program operates in much the same vein, although on a smaller scale. The primary characteristic that distinguishes the STTR program requires the SBC to partner with a non-profit organization or a university in order to mature and commercialize the innovation.
The competitive nature of the programs ensure that only the most promising of proposals, with the highest likelihood of potential innovation, commercial success, and mission infusion are selected. Figure 1 provides a visual representation and details the phased nature of the SBIR and STTR programs.

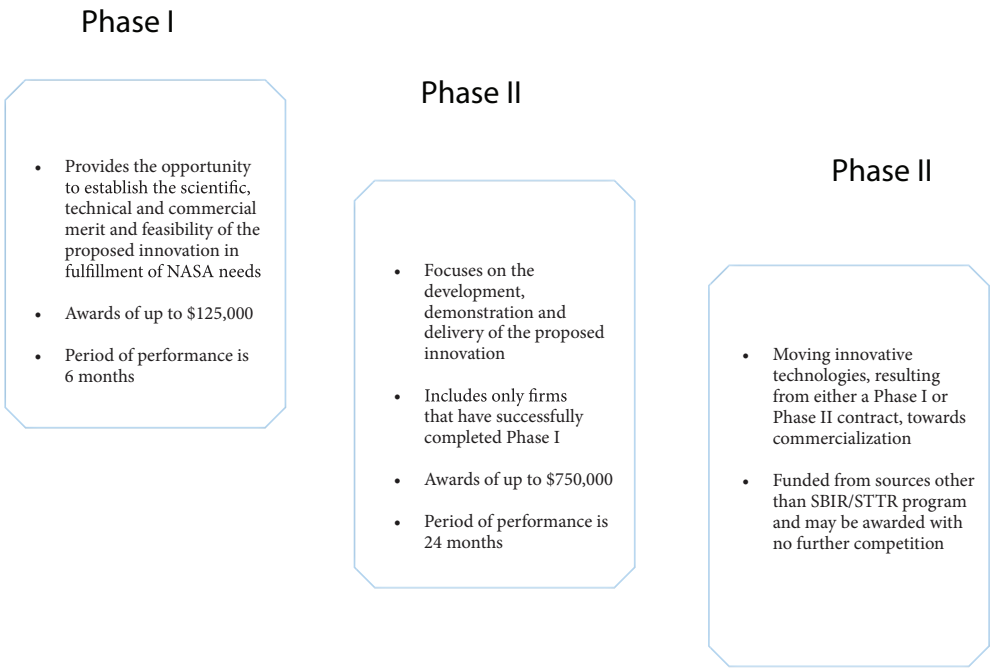


Figure 1 - SBIR and STTR Program Phases

Industry Description

NASA SBIR and STTR awards are given to small businesses who are classified under North American Industry Classification System (NAICS) industry 541712 [Research and development in the physical, engineering, and life sciences (except biotechnology)]. According to the U.S. Census bureau, companies represented by NAICS 541712 provide research and experimental development services in the physical, engineering, and life sciences, such as agriculture, electronics, environmental, biology, botany, computers, chemistry, food, fisheries, forests, geology, health, mathematics, medicine, oceanography, pharmacy, physics, veterinary and other allied subjects.

NAICS 541712 was created in 2007 in order to distinguish most scientific research and development from biotechnology research and experimental development, which remains classified under NAICS 541711. According to the 2007 U.S. Economic Census data, NAICS 541712 contains 7,831 firms nation-wide, which employ approximately 555,000 workers and generate over $71 billion in receipts and revenue annually. Figures 5 and 6 show the number of firms separated by employment size categories and revenue and receipts earned. A right skew to the histogram (figure 5) indicates that an inverse relationship exists between firm employment size and the number of firms, that is: the number of firms per category decreases as a firm's size increases. Over 92 percent of NAICS 541712 firms are small business with 499 employees or less; the histogram indicates that firms with less than five employees are the most common within the industry. However, the few large firms within the industry generate a disproportionate amount of the industry's revenues.

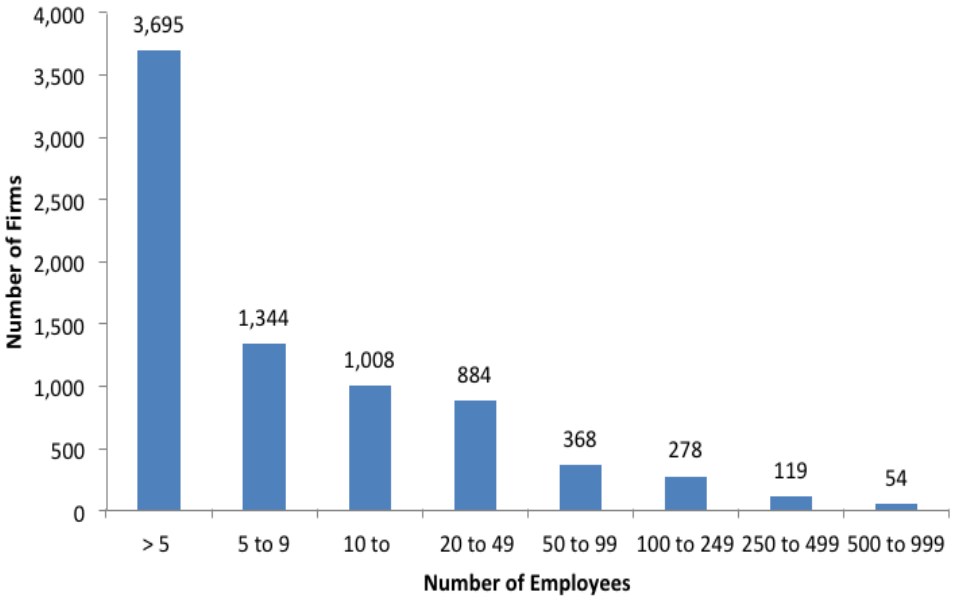


Figure 2 - NAICS 541712 Firms by Employment Size

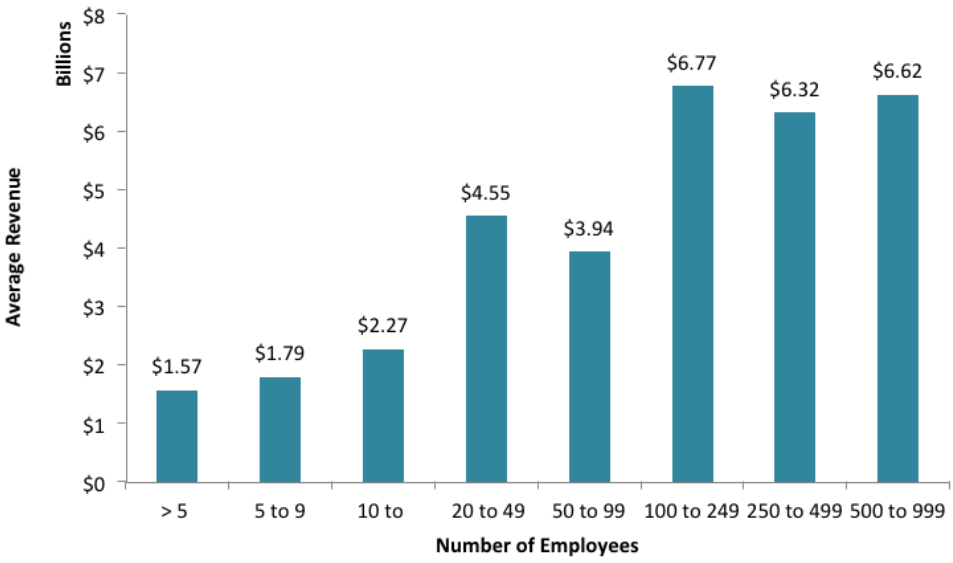


Figure 3 - NAICS 541712 Firms Receipts and Revenues by Size

III. New FY2012 SBIR and STTR Awards

2012 SBIR Program Selection and Award Description

In Fiscal Year 2012, NASA funded 258 Phase I awards at $125,000 each and 88 Phase II awards at $725,000 each.

Table 3- Number of FY2012 SBIR Awards

FY2012 Quantity of SBIR Phase I and Phase II Awards	
Quantity of FY2012 Phase II SBIRS	88
Quantity of FY2012 Phase I SBIRS	258

Figure 4 represents the number of award dollars that the 2012 SBIR program invested in each state through Phase I and II awards. NASA's SBIR and STTR program routinely analyzes and seeks to serve underrepresented states and as a result of the programs' efforts, small businesses from 38 states received at least one new SBIR award in FY2012. Total investment in each of these states ranges from approximately $125 thousand to over $6 million.

The figure indicates that coastal states and states containing the largest economies received a larger portion of SBIR funding than states concentrated in middle of the country with smaller economies. Historically as well as in the 2012 fiscal year, the States of California, Colorado, Connecticut, Maryland, Massachusetts, Texas, and Virginia are well represented in the program. Both Massachusetts and California received well over $6 million from NASA's SBIR Program.

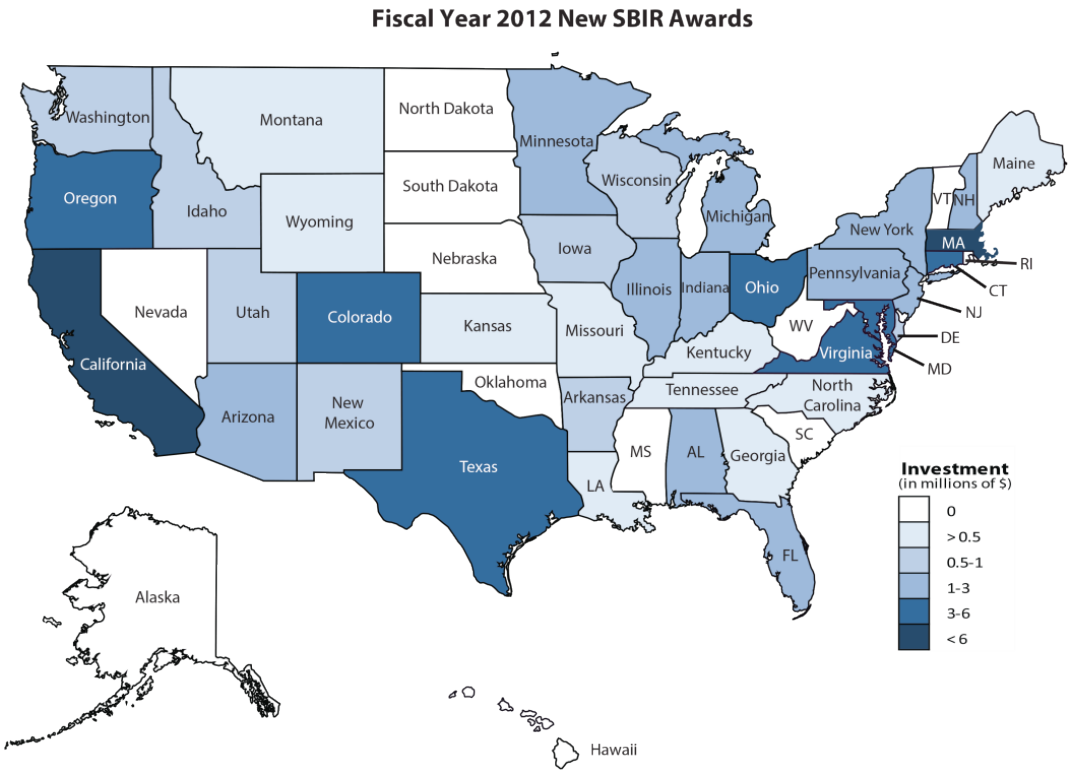


Figure 4 - Spatial Distribution of SBIR Award Dollars by State [FY2012]

2012 STTR Program Selection and Award Description

In Fiscal Year 2012, NASA funded 258 Phase I awards at $125,000 each and 88 Phase II awards at $725,000 each.

Table 4 - Number of FY2012 STTR Awards

FY2012 Quantity of STTR Phase I and Phase II Awards	
Quantity of FY2012 Phase II STTRs	10
Quantity of FY2012 Phase I STTRs	40

The STTR program awarded 10 states a new Phase I and/or Phase II award. Once again, California received the largest portion of the STTR program's award budget. Many mid-western states did not receive an STTR award in FY2012. Figure 5 further indicates that coastal states with large economies tend to outperform the rest of the country in both the SBIR and STTR programs. The high level of participation of firms from a handful of states appears to be due to the large number of quality universities within the awarded states, as well as their highly technical and diversified economies.

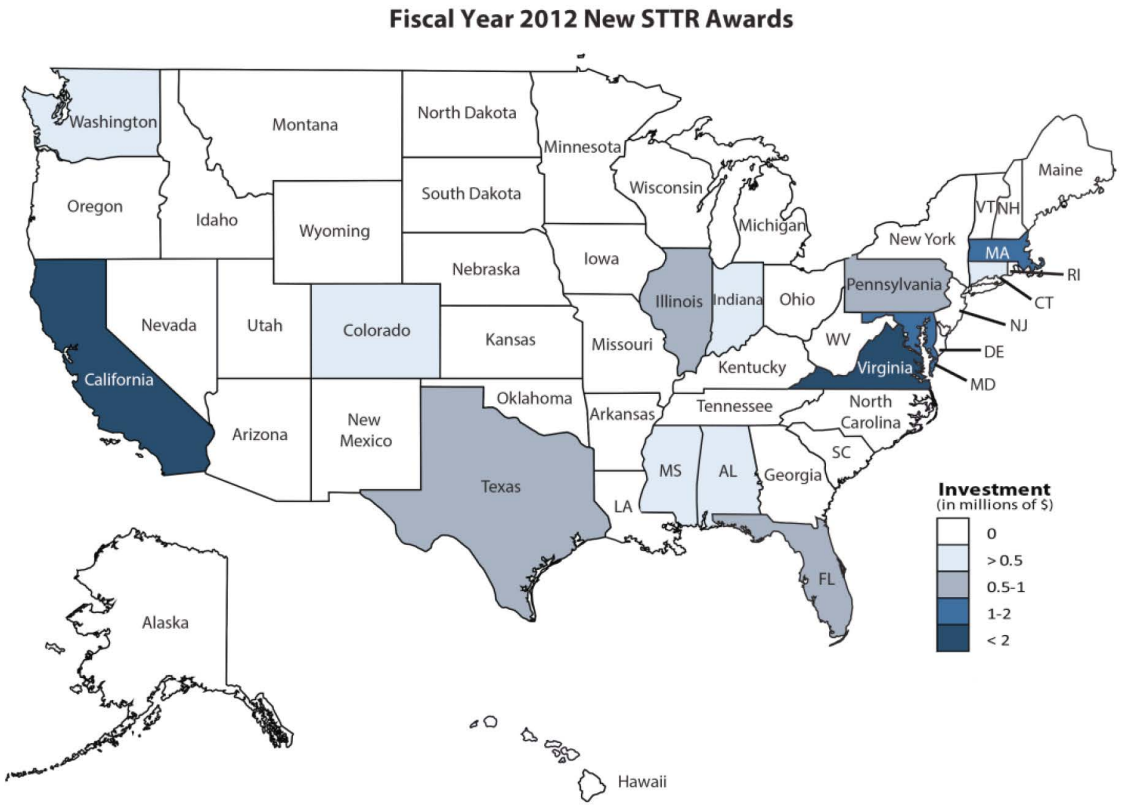


Figure 5 - Spatial Distribution of STTR Award Dollars by State [FY2012]

IV. Economic and Fiscal Impact

NASA SBIR and STTR awards have a broad national economic impact that is not simply limited to the States that received funding. While an analysis of only the states receiving awards would provide an insight into a portion of the economic impacts of the programs, the resulting analysis would underestimate the total national effects of the program. This is due to the fact that many firms purchase goods and services from suppliers in other states, including states where no SBIR or STTR awards are made.

As an example, an analysis focusing on the state-wide economic impact of an award given to a Texas firm for creation of novel space communication antenna would only estimate the indirect and induced impacts of good and services purchased within the State of Texas. This analysis would not take into account the complete economic impacts of the project if some portion of the project was supplied with goods and services from outside the region (such as testing equipment purchased from a firm in the State of Arkansas). Therefore, the economic impacts of the NASA SBIR and STTR programs are reported at the national level.

Estimated Employment

SBIR and STTR research and development activity across the United States has generated or retained significant employment across a variety of economic industries in fiscal year 2012. As detailed in Table 5 - National Employment Impacts below, it is estimated that 3,784 jobs were created or retained by the SBIR and STTR programs in FY2012. These 3,784 jobs can be further parsed into three groups:

1. direct jobs —jobs projected to take place at the participating SBCs— totaling 1,231.6;
2. indirect jobs —jobs created by suppliers of goods and services to the SBC— totaling 902.1; and
3. induced jobs — jobs created by increases in consumer spending— totaling 1,650.5.

Given the original investment and the resulting estimate job count, the results of the analysis indicate that NASA's SBIR and STTR programs create one job for every approximate $41,900.00[14] of funding.

Table 5 - National Employment Impacts

Employment Effect	SBIR	STTR	Total (SBIR + STTR)
Direct Effect	1,087	144	1,231
Indirect Effect	796	105	902
Induced Effect	1,457	193	1,650
Total Effect	3,341	442	3,784

Estimated Output (Gross Domestic Product)

It is estimated that the NASA SBIR and STTR programs have a significant annual effect on U.S. economic output in fiscal year 2012. NASA's SBIR program investment added approximately $557.68 million to the nation's economic output, also known as gross domestic product (GDP). The substantially smaller STTR program created approximately $73.84 million in economic output. In total, NASA $158.48 million investment and resulting economic activities added an estimated $631,531,510 to the nation's economic output, a return of approximately $3.98 for every dollar spent in awards (Table 6).

Table 6 - National Output Impact

National Output	SBIR	STTR	Total (SBIR + STTR)
Economic Output ($Millions)	$557.689	$73.841	$631.531

14 This value delineates the amount of funds required to create one direct, indirect, or induced job. The financial equivalent of a direct job with the Scientific Research and Development NAICS (541712) is approximately $128,682.68.

Labor Income

The SBIR and STTR programs also have a positive effect upon workers' earnings in the national economy. Labor income is the sum of both employee compensation and proprietor incom. The SBIR and STTR program combine to increase wages, income, and earnings by over $257.25 million nationally. Table 7 displays the direct, indirect, and induced labor income effects of both the combined SBIR and STTR programs.

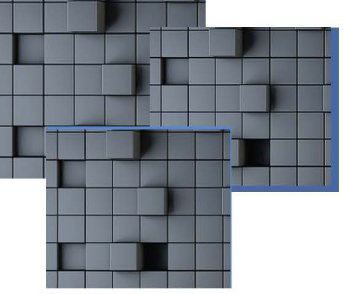
Table 7 - National Labor Income Impact

Labor Income	SBIR	STTR	Total (SBIR + STTR)
Direct Effect ($Millions)	$113.98	$15.0	$129.07
Indirect Effect ($Millions)	$43.49	$5.75	$49.25
Induced Effect ($Millions)	$69.69	$9.22	$78.92
Total Effect ($Millions)	$227.17	$30.07	$257.25

Gross vs. Net Economic Impacts

The magnitude of of the economic impact of a publically funded program, Depends upon the industry of investment and the magnitude of investment (amongst others). the measurable impacts can be reported in gross or net terms. Gross economic impacts take into account economic effects that are created by a project or program. Due to the dynamic nature of economics, simply providing gross effects can overstate the economic value of a project of program. Net economics impacts are those which incorporate offsetting effects such as displaced demand, lower household income, or lower household investment.

If gross impacts are those which are created without any consideration of whether they increase or impair spending elsewhere, than net impacts are those which attempt to capture, quantify, and



incorporate these offsetting effects. As an example, consider a high-end luxury developer who plans to demolish an old grocery store in order to build a fine-dining restaurant in its place. The resulting development would create 20 restaurant jobs as well as terminate 100 grocery store jobs. The gross impact of the restaurant development would be 20 jobs. But because the destruction of the grocery store eliminates 100 jobs, the net impact would be negative 80 jobs (20 jobs created – 100 jobs lost = -80 jobs).

When determining the net economic effect of a public policy or public program requiring government funds, a similar paradigm is employed. One must consider that taxes need to be levied upon American households and businesses in order to fund the public programs and services. These levied taxes are household funds that would otherwise be used in private consumption or investment. As an example, supposed a city raises $850 million dollars in taxes to construct a new football stadium. The stadium creates 1,000 jobs while the same $850 million in private consumption and investment would only create 900 jobs. The net effect of the stadium development would be a mere 100 jobs (1,000 jobs created by the stadium – 900 jobs which would have been created in the absence of construction = 100 jobs). Conversely if, if the stadium created less jobs than other would have been created by private consumption, the stadium would have a net negative economic impact.

Gross Job Impacts

Regarding gross job impacts, our analysis concludes:

- 2013 national SBIR and STTR investments into scientific and research and development industries is approximately $158.4 million.
- The programs' combined investment led to the creation of approximately 1,200 jobs directly in scientific research and development and approximately a combined approximately 3,341 jobs throughout the American economy in total.
- The job creation estimates only calculate jobs stemming from both programs' research and development efforts and do not estimate jobs emanating from the administration and management of the program.

Net Job Impacts

According to the data reported to the U.S. Small Business Administration (SBA) NASA's F.Y. 2012 investment into research and development companies is approximately $158.4 million.

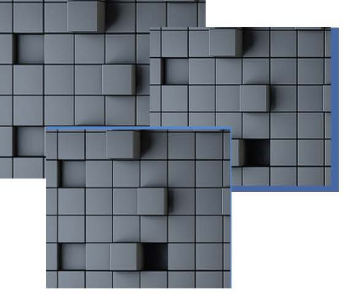
- The programs' diversion from private consumption and investment actually increases net employment by over 1,000 jobs.
- NASA SBIR and STTR programs create over $280 million in economic output that would not have been created if the programs did not exist and funds were simply left "in people's pockets".
- Without taking into account ancillary impacts (such as the advancement of new technologies and the creation of active marketplace businesses) the economic impact of the program is net-positive when compared to the control state.

Table 8 - Net Job Impacts

	Column A	Column B	Column C (Column A less Column B)
	Gross Investment	Gross Non-Investment	Net Investment
Employment	3,341	2,264	1,076
Output ($Millions)	$631.53	$350.8	$280.73

Implications

The analysis suggests that the NASA SBIR and STTR programs create more jobs than would otherwise be created if the program funding raised from taxes was left with households and businesses to spend on private consumption and investment activities. In other words, the programs have a positive economic net impact, not simply a positive gross economic impact. This is because investment into research and development technologies requires input from a broad–band of industries and typically creates well-paying jobs. This dispersion of capital into productive industries



allows these effects to circulate and perpetuate through the economy multiple times through high-impact industry.

Conversely, the median American household's top three purchases occur in three industries which either contain low-paying jobs or have very small multiplier effects, such as: (1) Food services and drinking places; (2) Real estate establishments; and (3) Private hospitals. The implication of the analysis is that, while consumer choice is often important feature of any market-driven economy, it also pays to facilitate small businesses — particularly in high value-added industries — like those focused on research and development of technologies.

Industry Sectors

The total economic impact of NASA SBIR and STTR investment takes place across various national industries by means of indirect and induced economic effects. Table 9 displays the 10 most impacted industries (by employment) due to NASA SBIR and STTR investment.

Most of the impacts occur in the scientific research and development services, because the industry impacts reflect the nature of the NASA's investment. However, service industries, real estate, and healthcare industries also received a share of the economic benefits from NASA's initial investment.

A complete listing of impacted industry sectors can be found in the appendix.

Table 9 - Top 10 Impacted Industries (Based Upon Employment Impacts)

IMPLAN Sector	Description	Employment	Labor Income ($Millions)	Value Added	Output
376	Scientific research and development services	1,245.4	$130.52	$147.24	$244.99
413	Food services and drinking places	197.8	$4.44	$6.40	$11.77
360	Real estate establishments	127.8	$1.99	$15.12	$20.53
382	Employment services	126.8	$4.00	$4.42	$5.44
388	Services to buildings and dwellings	124.3	$3.22	$3.91	$7.24
39	Maintenance and repair construction of nonresidential structures	93.2	$5.31	$5.66	$9.60
394	Offices of physicians, dentists, and other health practitioners	70.9	$5.72	$5.90	$9.15
397	Private hospitals	68	$4.74	$5.27	$9.65
319	Wholesale trade businesses	63.2	$5.04	$8.78	$11.70
356	Securities, commodity contracts, investments, and related activities	59.3	$3.90	$4.15	$10.48

*Please note that the values in the figure should be interpreted as illustrative of industry effects rather than precise given model and data limitations.

Estimated Tax Revenues

The economic activity derived from NASA SBIR and STTR's investment creates a substantial fiscal impact upon both federal and local governments. Table 10 shows the estimated total federal taxes generated by participating small businesses.

Approximately half of the federal taxes generated by the SBIR and STTR program are in the form of social insurance taxes, such as social security.

Table 10 - Estimated Federal Tax Revenue

Tax Type	Revenue Generated ($Millions)
Social insurance	$23.3
Personal income taxes	$17.66
Corporate profits taxes	$5.63
Fees and other federal payments	$0.49
Excise taxes	$1.17
Total federal taxes *	$48.27

Table 11 displays the estimated total state and local taxes generated by participating SBIR programs. Sales and income taxes comprise approximately half of the estimated total tax revenues, with fees, fines, and other taxes constituting the majority of the remainder.

Table 11 - Estimated State and Local Tax Revenue

Tax Type	Revenue Generated ($Millions)
Property taxes	$0.12
Sales taxes	$7.18
Income taxes	$4.78
Social insurance	$0.45
Fees, fines and other taxes	$10.52
Total state and local taxes *	$23.05

The $158.4 million direct divesture by NASA to the SBCs via the SBIR program and the subsequent economic output of $631.5 million, while only a fraction in terms of national GDP, has significant economic importance. The economic impact of government-sponsored research and development programs cannot and should not be understated entirely within their directly measurable effects on the economy due to the nature of research and development. The NASA SBIR and STTR programs have and will continue to serve as a successful platform in maintaining and promoting economic activities between the Federal Government and SBCs, as well as further driving technology and innovation.

V. Appendix: Complete Listing of Impacted Industry Sectors

Sector	Description	Direct	Indirect	Induced	Total
0	Total	1,231.6	902.1	1,650.5	3,784.2
376	Scientific research and development services	1,231.6	8.1	5.8	1,245.4
413	Food services and drinking places	0.0	45.8	152.0	197.8
360	Real estate establishments	0.0	47.7	80.1	127.8
382	Employment services	0.0	91.0	35.8	126.8
388	Services to buildings and dwellings	0.0	97.2	27.1	124.3
39	Maintenance and repair construction of nonresidential structures	0.0	76.6	16.7	93.2
394	Offices of physicians, dentists, and other health practitioners	0.0	0.0	70.9	70.9
397	Private hospitals	0.0	0.0	68.0	68.0
319	Wholesale trade businesses	0.0	10.3	52.8	63.2
356	Securities, commodity contracts, investments, and related activities	0.0	18.4	40.9	59.3
374	Management, scientific, and technical consulting services	0.0	42.8	10.9	53.7
329	Retail Stores - General merchandise	0.0	1.4	47.8	49.2
324	Retail Stores - Food and beverage	0.0	1.3	46.3	47.7
398	Nursing and residential care facilities	0.0	0.0	47.5	47.5
369	Architectural, engineering, and related services	0.0	38.3	7.4	45.7
425	Civic, social, professional, and similar organizations	0.0	16.7	26.7	43.4
354	Monetary authorities and depository credit intermediation activities	0.0	18.9	24.0	42.9
367	Legal services	0.0	21.6	18.3	39.9
368	Accounting, tax preparation, bookkeeping, and payroll services	0.0	18.0	13.1	31.0
386	Business support services	0.0	20.3	10.1	30.3
320	Retail Stores - Motor vehicle and parts	0.0	0.7	29.4	30.1

Sector	Description	Direct	Indirect	Induced	Total
357	Insurance carriers	0.0	5.3	23.5	28.8
400	Individual and family services	0.0	0.0	28.5	28.5
381	Management of companies and enterprises	0.0	13.5	14.0	27.5
358	Insurance agencies, brokerages, and related activities	0.0	7.6	17.8	25.5
331	Retail Nonstores - Direct and electronic sales	0.0	0.5	24.2	24.7
330	Retail Stores - Miscellaneous	0.0	0.7	23.8	24.5
327	Retail Stores - Clothing and clothing accessories	0.0	0.6	23.6	24.3
335	Transport by truck	0.0	8.0	15.8	23.8
380	All other miscellaneous professional, scientific, and technical services	0.0	19.9	3.1	22.9
411	Hotels and motels, including casino hotels	0.0	8.6	14.2	22.8
414	Automotive repair and maintenance, except car washes	0.0	6.1	15.9	21.9
392	Private junior colleges, colleges, universities, and professional schools	0.0	0.0	20.6	20.7
395	Home health care services	0.0	0.0	20.5	20.5
396	Medical and diagnostic labs and outpatient and other ambulatory care services	0.0	0.0	19.9	19.9
391	Private elementary and secondary schools	0.0	0.0	19.3	19.3
387	Investigation and security services	0.0	10.3	8.8	19.1
384	Office administrative services	0.0	14.3	4.6	18.9
399	Child day care services	0.0	0.0	18.7	18.7
325	Retail Stores - Health and personal care	0.0	0.5	17.3	17.9
351	Telecommunications	0.0	7.6	10.2	17.8

Appendix

Sector	Description	Direct	Indirect	Induced	Total
393	Other private educational services	0.0	0.3	16.5	16.8
426	Private household operations	0.0	0.0	16.5	16.5
355	Nondepository credit intermediation and related activities	0.0	3.0	12.6	15.6
419	Personal care services	0.0	0.0	15.4	15.4
377	Advertising and related services	0.0	7.4	7.8	15.2
338	Scenic and sightseeing transportation and support activities for transportation	0.0	10.0	5.1	15.0
372	Computer systems design services	0.0	10.7	3.9	14.6
375	Environmental and other technical consulting services	0.0	11.6	2.9	14.5
339	Couriers and messengers	0.0	7.3	6.7	14.0
323	Retail Stores - Building material and garden supply	0.0	0.5	13.3	13.8
432	Other state and local government enterprises	0.0	3.7	9.5	13.2
326	Retail Stores - Gasoline stations	0.0	0.2	12.7	12.9
424	Grantmaking, giving, and social advocacy organizations	0.0	0.2	12.5	12.7
409	Amusement parks, arcades, and gambling industries	0.0	0.0	12.5	12.5
328	Retail Stores - Sporting goods, hobby, book and music	0.0	0.3	11.8	12.1
19	Support activities for agriculture and forestry	0.0	6.0	5.2	11.3
427	US Postal Service	0.0	4.9	6.3	11.3
340	Warehousing and storage	0.0	4.1	6.6	10.7
401	Community food, housing, and other relief services, including rehabilitation services	0.0	0.0	10.6	10.6
336	Transit and ground passenger transportation	0.0	3.3	7.2	10.5

Sector	Description	Direct	Indirect	Induced	Total
359	Funds, trusts, and other financial vehicles	0.0	0.8	9.3	10.1
407	Fitness and recreational sports centers	0.0	1.7	7.6	9.3
421	Dry-cleaning and laundry services	0.0	3.0	6.2	9.1
417	Commercial and industrial machinery and equipment repair and maintenance	0.0	5.8	3.3	9.1
20	Extraction of oil and natural gas	0.0	3.7	5.2	8.9
2	Grain farming	0.0	2.9	6.0	8.9
404	Promoters of performing arts and sports and agents for public figures	0.0	1.7	7.2	8.9
389	Other support services	0.0	5.5	3.2	8.7
322	Retail Stores - Electronics and appliances	0.0	0.2	8.3	8.6
403	Spectator sports companies	0.0	2.0	6.3	8.3
422	Other personal services	0.0	1.8	6.5	8.3
410	Other amusement and recreation industries	0.0	1.1	7.2	8.3
113	Printing	0.0	4.0	4.0	8.0
402	Performing arts companies	0.0	0.9	7.1	8.0
321	Retail Stores - Furniture and home furnishings	0.0	0.2	7.6	7.8
14	Animal production, except cattle and poultry and eggs	0.0	3.1	4.6	7.8
383	Travel arrangement and reservation services	0.0	4.8	2.5	7.3
423	Religious organizations	0.0	0.0	7.1	7.1
390	Waste management and remediation services	0.0	3.3	3.6	6.9
334	Transport by water	0.0	6.3	0.5	6.8
31	Electric power generation, transmission, and distribution	0.0	2.1	4.5	6.7
373	Other computer related services, including facilities management	0.0	5.0	1.5	6.5

Appendix

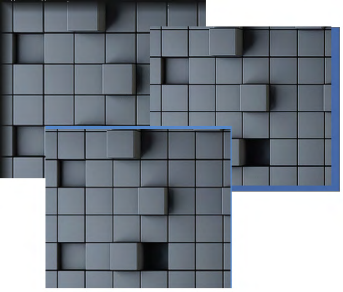
Sector	Description	Direct	Indirect	Induced	Total
332	Transport by air	0.0	1.6	4.4	6.0
379	Veterinary services	0.0	0.7	5.2	5.9
346	Motion picture and video industries	0.0	1.2	4.3	5.4
341	Newspaper publishers	0.0	1.9	3.2	5.1
11	Cattle ranching and farming	0.0	1.1	3.6	4.8
385	Facilities support services	0.0	3.4	1.3	4.8
348	Radio and television broadcasting	0.0	2.1	2.4	4.5
352	Data processing, hosting, ISP, web search portals and related services	0.0	1.2	3.2	4.4
283	Motor vehicle parts manufacturing	0.0	1.5	2.7	4.1
40	Maintenance and repair construction of residential structures	0.0	0.2	3.9	4.1
342	Periodical publishers	0.0	2.5	1.5	4.0
149	Other plastics product manufacturing	0.0	1.9	2.0	4.0
415	Car washes	0.0	0.7	3.2	3.9
430	State and local government passenger transit	0.0	1.2	2.6	3.9
405	Independent artists, writers, and performers	0.0	1.7	2.0	3.8
363	General and consumer goods rental except video tapes and discs	0.0	0.7	3.0	3.8
418	Personal and household goods repair and maintenance	0.0	2.2	1.5	3.7
362	Automotive equipment rental and leasing	0.0	1.3	2.4	3.7
416	Electronic and precision equipment repair and maintenance	0.0	2.0	1.6	3.6
195	Machine shops	0.0	2.1	1.4	3.4
350	Internet publishing and broadcasting	0.0	2.1	1.2	3.3
353	Other information services	0.0	2.7	0.5	3.3
60	Poultry processing	0.0	0.1	3.1	3.2
371	Custom computer programming services	0.0	2.2	0.9	3.1

Sector	Description	Direct	Indirect	Induced	Total
12	Dairy cattle and milk production	0.0	0.2	2.8	3.0
59	Animal (except poultry) slaughtering, rendering, and processing	0.0	0.2	2.8	3.0
412	Other accommodations	0.0	0.0	2.9	3.0
62	Bread and bakery product manufacturing	0.0	0.1	2.7	2.8
365	Commercial and industrial machinery and equipment rental and leasing	0.0	1.6	1.2	2.8
420	Death care services	0.0	0.0	2.7	2.7
370	Specialized design services	0.0	1.4	1.2	2.6
186	Plate work and fabricated structural product manufacturing	0.0	2.0	0.6	2.6
187	Ornamental and architectural metal products manufacturing	0.0	1.6	0.9	2.5
133	Pharmaceutical preparation manufacturing	0.0	0.2	2.2	2.4
10	All other crop farming	0.0	1.0	1.2	2.2
333	Transport by rail	0.0	0.9	1.3	2.2
87	Cut and sew apparel contractors	0.0	1.3	0.6	1.9
107	Paperboard container manufacturing	0.0	0.5	1.4	1.9
345	Software publishers	0.0	1.0	0.9	1.9
406	Museums, historical sites, zoos, and parks	0.0	0.0	1.8	1.8
6	Greenhouse, nursery, and floriculture production	0.0	0.2	1.6	1.8
349	Cable and other subscription programming	0.0	0.7	1.0	1.7
429	Other Federal Government enterprises	0.0	0.4	1.3	1.7
197	Coating, engraving, heat treating and allied activities	0.0	0.8	0.8	1.6
32	Natural gas distribution	0.0	0.5	1.1	1.6
152	Other rubber product manufacturing	0.0	1.3	0.2	1.6
1	Oilseed farming	0.0	0.2	1.3	1.5

Appendix

Sector	Description	Direct	Indirect	Induced	Total
70	Soft drink and ice manufacturing	0.0	0.1	1.4	1.5
378	Photographic services	0.0	0.1	1.3	1.4
99	Wood windows and doors and millwork manufacturing	0.0	0.7	0.7	1.4
295	Wood kitchen cabinet and countertop manufacturing	0.0	0.3	1.1	1.4
306	Surgical appliance and supplies manufacturing	0.0	0.3	1.0	1.3
431	State and local government electric utilities	0.0	0.4	0.9	1.3
95	Sawmills and wood preservation	0.0	0.7	0.6	1.3
53	Frozen food manufacturing	0.0	0.1	1.2	1.3
4	Fruit farming	0.0	0.1	1.1	1.2
344	Directory, mailing list, and other publishers	0.0	0.5	0.6	1.2
161	Ready-mix concrete manufacturing	0.0	0.9	0.3	1.2
54	Fruit and vegetable canning, pickling, and drying	0.0	0.1	1.1	1.2
115	Petroleum refineries	0.0	0.5	0.6	1.1
138	Soap and cleaning compound manufacturing	0.0	0.5	0.5	1.1
21	Mining coal	0.0	0.5	0.6	1.1
343	Book publishers	0.0	0.1	0.9	1.1
141	All other chemical product and preparation manufacturing	0.0	0.7	0.4	1.1
85	All other textile product mills	0.0	0.7	0.4	1.0
243	Semiconductor and related device manufacturing	0.0	0.4	0.6	1.0
3	Vegetable and melon farming	0.0	0.0	0.9	1.0
13	Poultry and egg production	0.0	0.0	0.9	0.9
16	Commercial logging	0.0	0.4	0.5	0.9
9	Sugarcane and sugar beet farming	0.0	0.3	0.6	0.9
105	Paper mills	0.0	0.2	0.7	0.9

Sector	Description	Direct	Indirect	Induced	Total
101	Manufactured home (mobile home) manufacturing	0.0	0.7	0.2	0.9
163	Other concrete product manufacturing	0.0	0.6	0.3	0.9
69	All other food manufacturing	0.0	0.1	0.7	0.9
25	Mining and quarrying stone	0.0	0.6	0.3	0.9
142	Plastics packaging materials and unlaminated film and sheet manufacturing	0.0	0.2	0.6	0.9
366	Lessors of nonfinancial intangible assets	0.0	0.5	0.3	0.8
317	All other miscellaneous manufacturing	0.0	0.1	0.7	0.8
276	Automobile manufacturing	0.0	0.0	0.8	0.8
296	Upholstered household furniture manufacturing	0.0	0.0	0.8	0.8
63	Cookie, cracker, and pasta manufacturing	0.0	0.0	0.7	0.8
364	Video tape and disc rental	0.0	0.0	0.8	0.8
100	Wood container and pallet manufacturing	0.0	0.3	0.5	0.8
170	Iron and steel mills and ferroalloy manufacturing	0.0	0.4	0.3	0.8
159	Glass product manufacturing made of purchased glass	0.0	0.5	0.3	0.8
309	Dental laboratories manufacturing	0.0	0.0	0.8	0.8
55	Fluid milk and butter manufacturing	0.0	0.0	0.7	0.8
202	Other fabricated metal manufacturing	0.0	0.4	0.3	0.7
139	Toilet preparation manufacturing	0.0	0.1	0.6	0.7
65	Snack food manufacturing	0.0	0.0	0.7	0.7
33	Water, sewage and other treatment and delivery systems	0.0	0.1	0.6	0.7
108	Coated and laminated paper, packaging paper and plastics film manufacturing	0.0	0.3	0.4	0.7



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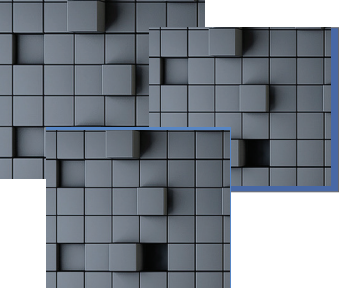
Sector	Description	Direct	Indirect	Induced	Total
216	Air conditioning, refrigeration, and warm air heating equipment manufacturing	0.0	0.3	0.3	0.6
56	Cheese manufacturing	0.0	0.1	0.6	0.6
26	Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals	0.0	0.5	0.1	0.6
114	Support activities for printing	0.0	0.3	0.3	0.6
126	Other basic organic chemical manufacturing	0.0	0.3	0.3	0.6
72	Wineries	0.0	0.0	0.6	0.6
198	Valve and fittings other than plumbing manufacturing	0.0	0.4	0.2	0.6
146	Polystyrene foam product manufacturing	0.0	0.3	0.3	0.6
337	Transport by pipeline	0.0	0.2	0.4	0.6
183	Crown and closure manufacturing and metal stamping	0.0	0.3	0.3	0.6
30	Support activities for other mining	0.0	0.5	0.1	0.6
61	Seafood product preparation and packaging	0.0	0.1	0.5	0.6
42	Other animal food manufacturing	0.0	0.2	0.4	0.6
260	Lighting fixture manufacturing	0.0	0.4	0.2	0.6
29	Support activities for oil and gas operations	0.0	0.2	0.3	0.6
147	Urethane and other foam product (except polystyrene) manufacturing	0.0	0.2	0.3	0.5
314	Sign manufacturing	0.0	0.3	0.3	0.5
89	Womens and girls cut and sew apparel manufacturing	0.0	0.0	0.5	0.5
150	Tire manufacturing	0.0	0.1	0.4	0.5
196	Turned product and screw, nut, and bolt manufacturing	0.0	0.2	0.3	0.5

Sector	Description	Direct	Indirect	Induced	Total
297	Nonupholstered wood household furniture manufacturing	0.0	0.0	0.5	0.5
157	Other pressed and blown glass and glassware manufacturing	0.0	0.4	0.1	0.5
68	Seasoning and dressing manufacturing	0.0	0.1	0.4	0.5
88	Mens and boys cut and sew apparel manufacturing	0.0	0.0	0.5	0.5
127	Plastics material and resin manufacturing	0.0	0.2	0.3	0.5
171	Steel product manufacturing from purchased steel	0.0	0.3	0.2	0.5
84	Textile bag and canvas mills	0.0	0.2	0.2	0.5
305	Surgical and medical instrument, laboratory and medical instrument manufacturing	0.0	0.1	0.4	0.5
80	Textile and fabric finising mills	0.0	0.2	0.3	0.5
311	Sporting and athletic goods manufacturing	0.0	0.0	0.5	0.5
143	Unlaminated plastics profile shape manufacturing	0.0	0.3	0.2	0.5
148	Plastics bottle manufacturing	0.0	0.1	0.4	0.5
180	Nonferrous metal foundries	0.0	0.2	0.2	0.5
194	Spring and wire product manufacturing	0.0	0.2	0.2	0.4
179	Ferrous metal foundries	0.0	0.2	0.2	0.4
51	Confectionery manufacturing from purchased chocolate	0.0	0.0	0.4	0.4
257	Software, audio, and video media for reproduction	0.0	0.3	0.1	0.4
103	All other miscellaneous wood product manufacturing	0.0	0.3	0.1	0.4
308	Ophthalmic goods manufacturing	0.0	0.0	0.4	0.4
290	Ship building and repairing	0.0	0.4	0.0	0.4



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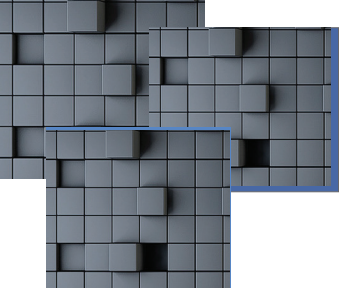
Sector	Description	Direct	Indirect	Induced	Total
136	Paint and coating manufacturing	0.0	0.2	0.2	0.4
234	Electronic computer manufacturing	0.0	0.1	0.3	0.4
287	Guided missile and space vehicle manufacturing	0.0	0.4	0.0	0.4
96	Veneer and plywood manufacturing	0.0	0.2	0.2	0.4
190	Metal can, box, and other metal container (light gauge) manufacturing	0.0	0.1	0.3	0.4
71	Breweries	0.0	0.0	0.4	0.4
246	Printed circuit assembly (electronic assembly) manufacturing	0.0	0.2	0.2	0.4
111	Sanitary paper product manufacturing	0.0	0.1	0.3	0.4
144	Plastics pipe and pipe fitting manufacturing	0.0	0.2	0.2	0.4
282	Travel trailer and camper manufacturing	0.0	0.2	0.2	0.4
162	Concrete pipe, brick, and block manufacturing	0.0	0.2	0.1	0.4
106	Paperboard Mills	0.0	0.2	0.2	0.4
166	Cut stone and stone product manufacturing	0.0	0.2	0.2	0.4
174	Aluminum product manufacturing from purchased aluminum	0.0	0.1	0.3	0.4
245	Electronic connector manufacturing	0.0	0.3	0.0	0.3
236	Computer terminals and other computer peripheral equipment manufacturing	0.0	0.1	0.2	0.3
273	Wiring device manufacturing	0.0	0.2	0.2	0.3
18	Commercial hunting and trapping	0.0	0.0	0.3	0.3
76	Broadwoven fabric mills	0.0	0.1	0.3	0.3
82	Carpet and rug mills	0.0	0.0	0.3	0.3
83	Curtain and linen mills	0.0	0.0	0.3	0.3
285	Aircraft engine and engine parts manufacturing	0.0	0.3	0.0	0.3

Sector	Description	Direct	Indirect	Induced	Total
247	Other electronic component manufacturing	0.0	0.1	0.2	0.3
58	Ice cream and frozen dessert manufacturing	0.0	0.0	0.3	0.3
188	Power boiler and heat exchanger manufacturing	0.0	0.2	0.1	0.3
215	Heating equipment (except warm air furnaces) manufacturing	0.0	0.2	0.1	0.3
315	Gasket, packing, and sealing device manufacturing	0.0	0.2	0.1	0.3
41	Dog and cat food manufacturing	0.0	0.0	0.3	0.3
129	Artificial and synthetic fibers and filaments manufacturing	0.0	0.1	0.2	0.3
97	Engineered wood member and truss manufacturing	0.0	0.1	0.2	0.3
239	Other communications equipment manufacturing	0.0	0.2	0.1	0.3
121	Industrial gas manufacturing	0.0	0.2	0.1	0.3
408	Bowling centers	0.0	0.0	0.3	0.3
86	Apparel knitting mills	0.0	0.0	0.3	0.3
75	Fiber, yarn, and thread mills	0.0	0.1	0.2	0.3
242	Bare printed circuit board manufacturing	0.0	0.2	0.1	0.3
181	All other forging, stamping, and sintering	0.0	0.2	0.1	0.3
347	Sound recording industries	0.0	0.0	0.3	0.3
154	Brick, tile, and other structural clay product manufacturing	0.0	0.2	0.1	0.3
207	Other industrial machinery manufacturing	0.0	0.2	0.1	0.3
90	Other cut and sew apparel manufacturing	0.0	0.0	0.3	0.3



Appendix

Sector	Description	Direct	Indirect	Induced	Total
302	Showcase, partition, shelving, and locker manufacturing	0.0	0.1	0.1	0.3
303	Mattress manufacturing	0.0	0.0	0.3	0.3
64	Tortilla manufacturing	0.0	0.0	0.3	0.3
193	Hardware manufacturing	0.0	0.1	0.1	0.3
134	In-vitro diagnostic substance manufacturing	0.0	0.0	0.2	0.2
268	Switchgear and switchboard apparatus manufacturing	0.0	0.2	0.1	0.2
269	Relay and industrial control manufacturing	0.0	0.1	0.1	0.2
116	Asphalt paving mixture and block manufacturing	0.0	0.2	0.1	0.2
277	Light truck and utility vehicle manufacturing	0.0	0.0	0.2	0.2
52	Nonchocolate confectionery manufacturing	0.0	0.0	0.2	0.2
43	Flour milling and malt manufacturing	0.0	0.0	0.2	0.2
5	Tree nut farming	0.0	0.0	0.2	0.2
214	Air purification and ventilation equipment manufacturing	0.0	0.2	0.0	0.2
8	Cotton farming	0.0	0.1	0.1	0.2
125	All other basic inorganic chemical manufacturing	0.0	0.1	0.1	0.2
200	Ball and roller bearing manufacturing	0.0	0.1	0.1	0.2
291	Boat building	0.0	0.0	0.2	0.2
164	Lime and gypsum product manufacturing	0.0	0.1	0.1	0.2
120	Petrochemical manufacturing	0.0	0.1	0.1	0.2
137	Adhesive manufacturing	0.0	0.1	0.1	0.2
130	Fertilizer manufacturing	0.0	0.1	0.1	0.2
185	Handtool manufacturing	0.0	0.1	0.1	0.2

Sector	Description	Direct	Indirect	Induced	Total
24	Mining gold, silver, and other metal ore	0.0	0.2	0.1	0.2
74	Tobacco product manufacturing	0.0	0.0	0.2	0.2
158	Glass container manufacturing	0.0	0.0	0.2	0.2
267	Motor and generator manufacturing	0.0	0.1	0.1	0.2
145	Laminated plastics plate, sheet (except packaging), and shape manufacturing	0.0	0.1	0.1	0.2
135	Biological product (except diagnostic) manufacturing	0.0	0.1	0.1	0.2
47	Breakfast cereal manufacturing	0.0	0.0	0.2	0.2
109	All other paper bag and coated and treated paper manufacturing	0.0	0.0	0.2	0.2
281	Motor home manufacturing	0.0	0.0	0.2	0.2
201	Fabricated pipe and pipe fitting manufacturing	0.0	0.1	0.1	0.2
428	Federal electric utilities	0.0	0.1	0.1	0.2
270	Storage battery manufacturing	0.0	0.1	0.1	0.2
66	Coffe and tea manfacturing	0.0	0.0	0.2	0.2
228	Material handling equipment manufacturing	0.0	0.1	0.1	0.2
220	Cutting tool and machine tool accessory manufacturing	0.0	0.1	0.1	0.2
313	Office supplies (except paper) manufacturing	0.0	0.1	0.1	0.2
177	Copper rolling, drawing, extruding and alloying	0.0	0.1	0.1	0.2
15	Forestry, forest products, and timber tract production	0.0	0.1	0.1	0.2
304	Blind and shade manufacturing	0.0	0.0	0.2	0.2
248	Electromedical and electrotherapeutic apparatus manufacturing	0.0	0.0	0.2	0.2
250	Automatic environmental control manufacturing	0.0	0.1	0.1	0.2

Appendix

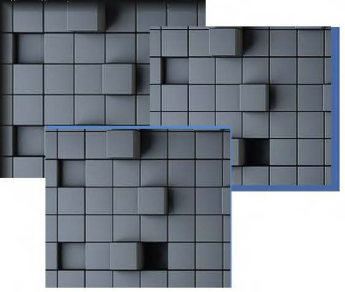
Sector	Description	Direct	Indirect	Induced	Total
93	Footwear manufacturing	0.0	0.0	0.2	0.2
23	Mining copper, nickel, lead, and zinc	0.0	0.1	0.1	0.2
67	Flavoring syrup and concentrate manufacturing	0.0	0.0	0.1	0.2
272	Communication and energy wire and cable manufacturing	0.0	0.1	0.1	0.2
203	Farm machinery and equipment manufacturing	0.0	0.1	0.0	0.2
219	Special tool, die, jig, and fixture manufacturing	0.0	0.1	0.1	0.2
168	Mineral wool manufacturing	0.0	0.1	0.1	0.2
199	Plumbing fixture fitting and trim manufacturing	0.0	0.1	0.1	0.2
44	Wet corn milling	0.0	0.0	0.1	0.2
17	Commercial Fishing	0.0	0.0	0.1	0.2
189	Metal tank (heavy gauge) manufacturing	0.0	0.1	0.1	0.2
312	Doll, toy, and game manufacturing	0.0	0.0	0.2	0.2
153	Pottery, ceramics, and plumbing fixture manufacturing	0.0	0.1	0.1	0.2
112	All other converted paper product manufacturing	0.0	0.0	0.1	0.2
78	Nonwoven fabric mills	0.0	0.1	0.1	0.2
160	Cement manufacturing	0.0	0.1	0.0	0.2
57	Dry, condensed, and evaporated dairy product manufacturing	0.0	0.0	0.1	0.2
310	Jewelry and silverware manufacturing	0.0	0.0	0.2	0.2
271	Primary battery manufacturing	0.0	0.0	0.2	0.2
307	Dental equipment and supplies manufacturing	0.0	0.0	0.2	0.2
117	Asphalt shingle and coating materials manufacturing	0.0	0.1	0.1	0.2

Sector	Description	Direct	Indirect	Induced	Total
240	Audio and video equipment manufacturing	0.0	0.0	0.1	0.2
300	Office Furniture	0.0	0.0	0.1	0.2
294	All other transportation equipment manufacturing	0.0	0.0	0.1	0.2
233	Fluid power process machinery manufacturing	0.0	0.1	0.1	0.2
122	Synthetic dye and pigment manufacturing	0.0	0.1	0.1	0.1
318	Broom, brush, and mop manufacturing	0.0	0.0	0.1	0.1
110	Stationery product manufacturing	0.0	0.0	0.1	0.1
131	Pesticide and other agricultural chemical manufacturing	0.0	0.0	0.1	0.1
279	Motor vehicle body manufacturing	0.0	0.0	0.1	0.1
204	Lawn and garden equipment manufacturing	0.0	0.1	0.1	0.1
225	Other engine equipment manufacturing	0.0	0.1	0.1	0.1
151	Rubber and plastics hoses and belting manufacturing	0.0	0.1	0.1	0.1
275	All other miscellaneous electrical equipment and component manufacturing	0.0	0.1	0.0	0.1
118	Petroleum lubricating oil and grease manufacturing	0.0	0.0	0.1	0.1
217	Industrial mold manufacturing	0.0	0.1	0.0	0.1
263	Household refrigerator and home freezer manufacturing	0.0	0.0	0.1	0.1
298	Metal and other household furniture manufacturing	0.0	0.0	0.1	0.1
178	Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying	0.0	0.1	0.1	0.1

Appendix

Sector	Description	Direct	Indirect	Induced	Total
256	Watch, clock, and other measuring and controlling device manufacturing	0.0	0.0	0.1	0.1
27	Mining and quarrying other nonmetallic minerals	0.0	0.1	0.1	0.1
102	Prefabricated wood building manufacturing	0.0	0.1	0.0	0.1
251	Industrial process variable instruments manufacturing	0.0	0.1	0.1	0.1
140	Printing ink manufacturing	0.0	0.1	0.1	0.1
292	Motorcycle, bicycle, and parts manufacturing	0.0	0.0	0.1	0.1
261	Small electrical appliance manufacturing	0.0	0.0	0.1	0.1
91	Apparel accessories and other apparel manufacturing	0.0	0.0	0.1	0.1
288	Propulsion units and parts for space vehicles and guided missiles manufacturing	0.0	0.1	0.0	0.1
184	Cutlery, utensil, pot, and pan manufacturing	0.0	0.0	0.1	0.1
264	Household laundry equipment manufacturing	0.0	0.0	0.1	0.1
94	Other leather and allied product manufacturing	0.0	0.0	0.1	0.1
132	Medicinal and botanical manufacturing	0.0	0.0	0.1	0.1
252	Totalizing fluid meters and counting devices manufacturing	0.0	0.1	0.1	0.1
73	Distilleries	0.0	0.0	0.1	0.1
123	Alkalies and chlorine manufacturing	0.0	0.1	0.1	0.1
265	Other major household appliance manufacturing	0.0	0.0	0.1	0.1

Sector	Description	Direct	Indirect	Induced	Total
238	Broadcast and wireless communications equipment manufacturing	0.0	0.0	0.1	0.1
266	Power, distribution, and specialty transformer manufacturing	0.0	0.1	0.0	0.1
254	Analytical laboratory instrument manufacturing	0.0	0.1	0.1	0.1
169	Miscellaneous nonmetallic mineral product manufacturing	0.0	0.1	0.0	0.1
237	Telephone apparatus manufacturing	0.0	0.0	0.1	0.1
7	Tobacco farming	0.0	0.0	0.1	0.1
262	Household cooking appliance manufacturing	0.0	0.0	0.1	0.1
222	Turbine and turbine generator set units manufacturing	0.0	0.0	0.0	0.1
172	Alumina refining and primary aluminum production	0.0	0.0	0.1	0.1
206	Mining and oil and gas field machinery manufacturing	0.0	0.1	0.0	0.1
274	Carbon and graphite product manufacturing	0.0	0.1	0.0	0.1
128	Synthetic rubber manufacturing	0.0	0.0	0.0	0.1
223	Speed changer, industrial high-speed drive, and gear manufacturing	0.0	0.1	0.0	0.1
45	Soybean and other oilseed processing	0.0	0.0	0.1	0.1
156	Flat glass manufacturing	0.0	0.0	0.0	0.1
259	Electric lamp bulb and part manufacturing	0.0	0.0	0.1	0.1
224	Mechanical power transmission equipment manufacturing	0.0	0.1	0.0	0.1
192	Arms, ordnance, and accessories manufacturing	0.0	0.0	0.1	0.1
49	Beet sugar manufacturing	0.0	0.0	0.1	0.1
48	Sugar can mills and refining	0.0	0.0	0.1	0.1



Appendix

Sector	Description	Direct	Indirect	Induced	Total
209	Semiconductor machinery manufacturing	0.0	0.1	0.0	0.1
46	**Fats and oils refining and blending**	0.0	0.0	0.1	0.1
81	Fabric coating mills	0.0	0.0	0.0	0.1
244	Electronic capacitor, resistor, coil, transformer, and other inductor manufacturing	0.0	0.0	0.0	0.1
235	Computer storage device manufacturing	0.0	0.0	0.1	0.1
50	Chocolate and confectionery manufacturing from cacao beans	0.0	0.0	0.1	0.1
98	Reconstituted wood product manufacturing	0.0	0.0	0.1	0.1
205	Construction machinery manufacturing	0.0	0.1	0.0	0.1
22	Mining iron ore	0.0	0.1	0.0	0.1
226	Pump and pumping equipment manufacturing	0.0	0.0	0.0	0.1
119	All other petroleum and coal products manufacturing	0.0	0.0	0.0	0.1
165	Abrasive product manufacturing	0.0	0.0	0.0	0.1
289	Railroad rolling stock manufacturing	0.0	0.0	0.0	0.1
286	Other aircraft parts and auxiliary equipment manufacturing	0.0	0.0	0.0	0.1
191	Ammunition manufacturing	0.0	0.0	0.0	0.1
213	Other commercial and service industry machinery manufacturing	0.0	0.0	0.0	0.1
167	Ground or treated mineral and earth manufacturing	0.0	0.0	0.0	0.1
155	Clay and nonclay refractory manufacturing	0.0	0.0	0.0	0.1
316	Musical instrument manufacturing	0.0	0.0	0.1	0.1

Sector	Description	Direct	Indirect	Induced	Total
211	Optical instrument and lens manufacturing	0.0	0.0	0.0	0.1
249	Search, detection, and navigation instruments manufacturing	0.0	0.0	0.0	0.1
182	Custom roll forming	0.0	0.0	0.0	0.0
258	Magnetic and optical recording media manufacturing	0.0	0.0	0.0	0.0
173	Secondary smelting and alloying of aluminum	0.0	0.0	0.0	0.0
218	Metal cutting and forming machine tool manufacturing	0.0	0.0	0.0	0.0
79	Knit fabric mills	0.0	0.0	0.0	0.0
231	Packaging machinery manufacturing	0.0	0.0	0.0	0.0
210	Vending, commercial, industrial, and office machinery manufacturing	0.0	0.0	0.0	0.0
77	Narrow fabric mills and schiffli machine embroidery	0.0	0.0	0.0	0.0
229	Power-driven handtool manufacturing	0.0	0.0	0.0	0.0
284	Aircraft manufacturing	0.0	0.0	0.0	0.0
253	Electricity and signal testing instruments manufacturing	0.0	0.0	0.0	0.0
241	Electron tube manufacturing	0.0	0.0	0.0	0.0
278	Heavy duty truck manufacturing	0.0	0.0	0.0	0.0
104	Pulp mills	0.0	0.0	0.0	0.0
208	Plastics and rubber industry machinery manufacturing	0.0	0.0	0.0	0.0
232	Industrial process furnace and oven manufacturing	0.0	0.0	0.0	0.0
227	Air and gas compressor manufacturing	0.0	0.0	0.0	0.0
299	Institutional furniture manufacturing	0.0	0.0	0.0	0.0
124	Carbon black manufacturing	0.0	0.0	0.0	0.0
221	Rolling mill and other metalworking machinery manufacturing	0.0	0.0	0.0	0.0

Appendix

Sector	Description	Direct	Indirect	Induced	Total
92	Leather and hide tanning and finishing	0.0	0.0	0.0	0.0
176	Primary smelting and refining of nonferrous metal (except copper and aluminum)	0.0	0.0	0.0	0.0
230	Other general purpose machinery manufacturing	0.0	0.0	0.0	0.0
175	Primary smelting and refining of copper	0.0	0.0	0.0	0.0
293	Military armored vehicle, tank, and tank component manufacturing	0.0	0.0	0.0	0.0
212	Photographic and photocopying equipment manufacturing	0.0	0.0	0.0	0.0
280	Truck trailer manufacturing	0.0	0.0	0.0	0.0
301	Custom architectural woodwork and millwork manufacturing	0.0	0.0	0.0	0.0
255	Irradiation apparatus manufacturing	0.0	0.0	0.0	0.0
38	Construction of other new residential structures	0.0	0.0	0.0	0.0
28	Drilling oil and gas wells	0.0	0.0	0.0	0.0
34	Construction of new nonresidential commercial and health care structures	0.0	0.0	0.0	0.0
35	Construction of new nonresidential manufacturing structures	0.0	0.0	0.0	0.0
36	Construction of other new nonresidential structures	0.0	0.0	0.0	0.0
37	Construction of new residential permanent site single- and multi-family structures	0.0	0.0	0.0	0.0
361	Imputed rental activity for owner-occupied dwellings	0.0	0.0	0.0	0.0
433	* Not an industry (Used and secondhand goods)	0.0	0.0	0.0	0.0

Sector	Description	Direct	Indirect	Induced	Total
434	* Not an industry (Scrap)	0.0	0.0	0.0	0.0
435	* Not an industry (Rest of the world adjustment)	0.0	0.0	0.0	0.0
436	* Not an industry (Noncomparable foreign imports)	0.0	0.0	0.0	0.0
437	* Employment and payroll only (state & local govt, non-education)	0.0	0.0	0.0	0.0
438	* Employment and payroll only (state & local govt, education)	0.0	0.0	0.0	0.0
439	* Employment and payroll only (federal govt, non-military)	0.0	0.0	0.0	0.0
440	* Employment and payroll only (federal govt, military)	0.0	0.0	0.0	0.0

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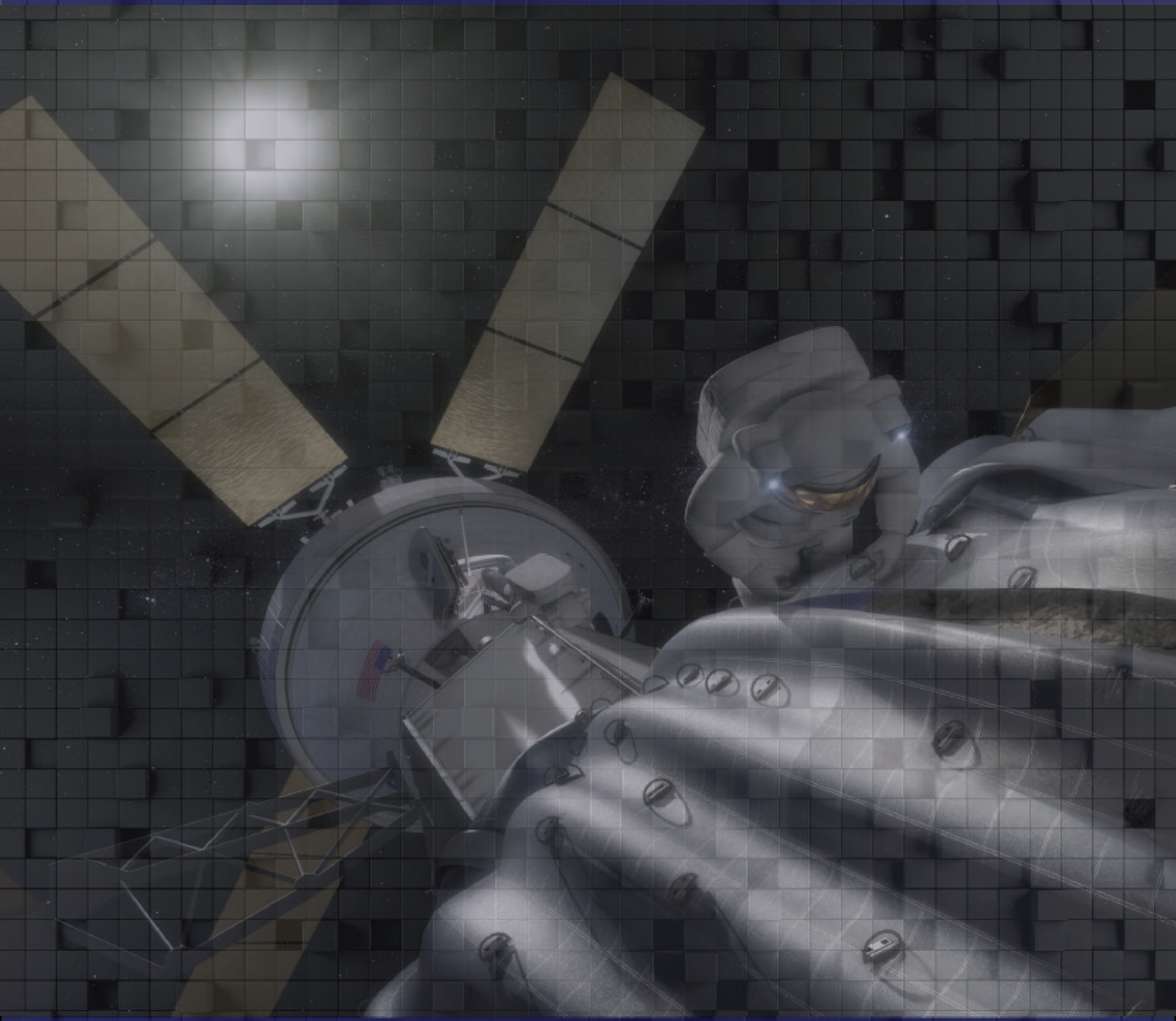

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